Autosustainables for Global Sustainability

Technical Justification for Networked Deurbanism (#SmartDeurbanism) Towards an Ecologically and Demographically Self-Sustaining Humanity

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Abstract

This paper argues that distributed self-sufficiency can become a new paradigm of territorial, ecological, and population planning. The central thesis is that the contemporary ecological problem does not depend only on the number of inhabitants on the planet, but above all on the material form in which that population lives: concentrated, dependent, energetically passive, disconnected from food production, and urbanistically subordinated to large centralized infrastructures.

The Autosustainables project proposes an alternative: a planned networked deurbanism —a #SmartDeurbanism— based on self-sufficient cells or plots capable of producing part of their energy, part of their food, part of their economic activity, and part of their family continuity. This model should not be understood as an individualist retreat, but as a replicable form of distributed sustainability: self-sufficiency not merely for one individual, but for a humanity capable of sustaining itself without destroying the world that sustains it.

The formula that summarizes the project is:

Autosustainables for global sustainability.

This expression means that self-sufficiency is not merely a private survival strategy, but a territorial, ecological, and demographic architecture designed to make possible a freer, more resilient, and more sustainable humanity. The objective is not for a few privileged individuals to escape the city and live outside the system, but for the material structure of human life itself to be reorganized so that each family unit, each plot, and each community can better sustain itself while also contributing to the sustainability of the whole.

The project is especially relevant now because several technologies that previously did not exist, or were not sufficiently accessible, have converged: high-speed internet outside

urban centers, satellite internet, cheap solar energy, increasingly affordable batteries, electric tools, remote work, digital education, modular water-capture systems, regenerative agriculture, and productive micro-infrastructures. It is therefore a post-urbanist, but not pre-urban, proposal: it does not seek to return to a world before the city, but to overcome urban concentration through technological capabilities developed by modernity itself.

The technical hypothesis of this paper is that the model's basic infrastructure —solar panels, batteries, shared electric vehicles, digital connectivity, and electric tools— has a relatively low annualized footprint when calculated over its useful life. The Autosustainables model is therefore better than it may initially appear: the main problem is not that a self-sufficient plot requires batteries or solar panels, but that humanity maintains a global level of consumption, food demand, construction, services, and total population that exceeds the planet's capacity.

This requires us to think about global sustainability in two major stages. In the first, the ecological footprint per person must be reduced and, in all likelihood, the world population must stabilize or decline towards levels compatible with planetary biocapacity. In the second, once a sustainable level has been reached, sustainability can no longer mean indefinite decline. It must mean stabilizing population at that level and ensuring that each family, community, and territorial unit is capable of continuing. At that point, the self-sufficient plot ceases to be only an ecological unit and also becomes a unit of demographic and existential sustainability.

The question is no longer only how many people the planet can sustain, but under what model of life it can sustain them. And once ecological sustainability has been achieved, the question will also be what form of life can sustain human continuity without destroying territory or dissolving the family. The resulting population must be simultaneously ecologically sustainable, demographically sufficient, and capable of preserving human continuity: it is not enough for it to fit within planetary limits; it must also be able to remain within them.

Keywords: Autosustainables; global sustainability; networked deurbanism; self-sufficient plot; ecological footprint; carbon footprint; demographic sustainability; population stabilization; technological rurality; energy autonomy; remote work; food self-production; family continuity; territorial planning; #SmartDeurbanism; post-urbanism; modern networked rurality; territorial fraternity.

Technological Inversion of Population Concentration: The Autosustainable Deurbanization Curve

The graphic model accompanying this paper summarizes a central thesis: the relationship between technological development and the territorial concentration of population is not linear but bi-phasic.

During a first stage, technological progress increases population concentration. Agricultural surpluses, occupational specialization, ports, factories, railways, sanitation networks, hospitals, universities, and offices concentrate people because production, services, energy, and knowledge require physical proximity and centralized infrastructure. This is the urbanizing phase.

Beyond a certain historical and technological threshold, the same technology begins to produce the opposite effect. Digital connectivity, satellite internet, distributed energy generation, electricity storage, remote work, digital education, telemedicine, automation, and distributed manufacturing reduce the urban premium and make a deurbanizing phase possible. Technology continues to advance, while the need for physical concentration declines.

The X-axis represents a territorial population concentration index from 0 to 1. Several indicators are valid for this purpose: a spatial Gini coefficient, a normalized Hoover index, or a normalized Herfindahl-Hirschman Index —HHI. All three can be used as territorial concentration measures, provided that spatial units are defined and the methodology remains consistent.

The Y-axis represents the technological level. The curve traces a historical trajectory beginning with low-concentration primitive societies, passing through early civilizations, fifteenth-century England, eighteenth-century England, the twentieth century, and the contemporary metropolitan concentration peak around 2025. From that turning point, the curve bends and progresses again towards values close to zero on the concentration axis without declining technologically.

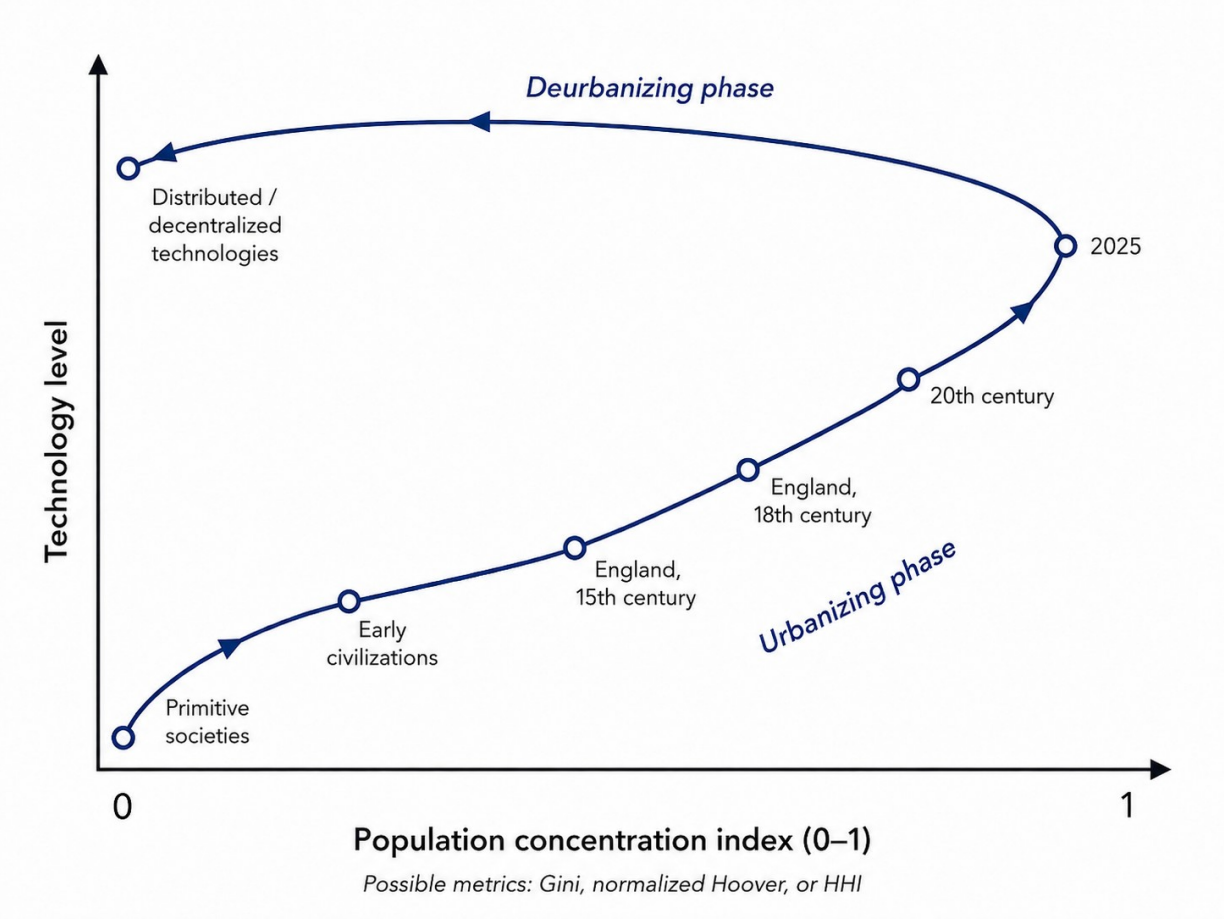

Figure 1. Technological Inversion of Population Concentration: The Autosustainable Deurbanization Curve. Conceptual model by Xema Gatnau.

The final distribution is not equivalent to primitive dispersion. The first dispersion resulted from low productivity, weak infrastructure, and an inability to sustain large concentrations.

Advanced distribution would produce the opposite result: society can disperse because it has sufficient technology, productivity, connectivity, energy, and automation. The former is dispersion through limitation; the latter is distribution through autonomy.

Nor does the model describe conventional suburbia. Suburbia preserves dependence on the city: dispersed housing, compulsory car use, metropolitan employment, centralized energy, and little local production. Autosustainable deurbanism requires functional rather than merely residential deconcentration: own energy, storage, remote work, partial food production, fewer compulsory journeys, and networked cooperation between relatively autonomous units.

The thesis can be summarized as follows:

Rising industrial technology → greater need for proximity → greater urban concentration.

Rising distributed technology → lower need for proximity → networked autosustainable deurbanization.

The city does not disappear, but it ceases to be the compulsory destination of all modern life. It changes from the absolute center of the residential system into one node within a more distributed territorial network.

1. The Problem: Not Only How Many We Are, but How We Live

The ecological debate is usually framed in two extreme ways. The first emphasizes overpopulation: the world would simply have too many people. The second emphasizes unequal consumption: the problem would not be the number of inhabitants, but the level of consumption and emissions of certain societies.

Both views contain part of the truth, but both are incomplete. Population matters, because any individual footprint multiplied by billions becomes planetary pressure. But per capita consumption matters even more, because a humanity of 8 or 10 billion people may be either unsustainable or relatively sustainable depending on its way of life, its energy system, its food system, its mobility, and its urbanism.

The basic formula is simple:

Total impact = population × impact per person

Therefore, there are two ways to reduce pressure on the planet: reduce population or reduce impact per person. The first path is slow, conflictual, and ethically delicate. The second is immediately practicable if the infrastructure of life is modified.

Autosustainables belongs initially to this second field: it does not begin with a fantasy of human disappearance, but with a reorganization of the way we inhabit the world.

The problem of the contemporary urban model is that it tends to make the individual completely dependent. The average urban inhabitant does not produce energy, does not produce food, does not control water, does not possess productive land, depends on long logistical chains, lives under a concentrated housing market, and requires complex infrastructures to sustain everyday life.

The city has historically been a motor of culture, trade, and innovation. But the contemporary metropolis has gone further: it has turned dependence into the normal condition of life.

The problem is not that cities exist. The problem is that the city has become the compulsory destination of modernity.

2. The Thesis: Self-Sufficiency as a New Urban Unit

The novelty of the Autosustainables project is not self-sufficiency itself. Self-sufficiency has always existed: farmhouses, farms, villages, family gardens, rural communities, ecovillages, cooperatives, passive houses, permaculture, and other less dependent forms of life.

The novelty is to elevate self-sufficiency into a principle of territorial planning.

In other words: to stop thinking of it as a private, marginal, or alternative practice, and to begin thinking of it as an urban and population unit.

The basic unit of old urbanism is the block, the urban buildable plot, the neighborhood, the industrial estate, the road axis, or the metropolitan area.

The basic unit of autosustainable deurbanism is the living plot.

A living plot is a territorial unit capable of integrating:

1. housing;

2. its own, or partially own, energy generation;

3. energy storage;

4. a garden or partial food self-production;

5. a possible chicken coop or small-scale low-intensity domestic livestock;

6. water capture or efficient water management;

7. digital connection;

8. remote work space;

9. family or community educational space;

10. a workshop, storage area, or microproductive activity;

11. connection with other plots and local nodes.

The plot is not merely property. It is a cell of civilization.

This conception restores a deeper meaning of dwelling. In “Building Dwelling Thinking,” Martin Heidegger distinguished between mere accommodation inside a building and dwelling as an enduring relationship with place, the world, and others. Autosustainables does not merely propose another residential typology, but a transformation of that material and existential relationship with territory.

But a cell is not a complete organism. That is why Autosustainables does not defend isolation. It defends the network.

The model is both cellular and reticular. Each plot must be able to function with a significant degree of autonomy, but it must also be designed to connect with other plots, paths, shared services, energy communities, local cooperatives, exchange networks, distributed education, and common micro-infrastructures.

This differentiates the project both from individualist survivalism and from chaotic urban sprawl. It is not about each person fleeing on their own. It is about making a new form of inhabiting replicable.

3. Why It Is Possible Now

This project would have been far more difficult thirty years ago. Rural life could offer land, air, water, and food, but it was often separated from qualified work, connectivity, advanced education, and certain economic opportunities.

The situation has changed.

The first great transformation is connectivity. Internet, rural fiber, 4G, 5G, and satellite internet allow a growing part of work, training, administration, and cultural life to take place outside the city. Physical location no longer determines access to knowledge, work, or communication so rigidly.

The second transformation is solar energy. The fall in the cost of photovoltaic panels and their global expansion make it possible for a house, a farm, or a small community to produce a significant part of its electricity. This does not eliminate all dependencies, but it radically reduces the need for absolute energy centralization.

The third transformation is storage. Batteries, especially lithium iron phosphate batteries and other developing storage technologies, make it possible to soften solar intermittency and provide night-time or multi-day autonomy to small inhabited units.

The fourth transformation is remote work. If part of the economy no longer requires daily presence in an urban office, the structural justification for metropolitan concentration weakens.

The fifth transformation is the electrification of tools and mobility. Electric vehicles, electric bicycles, electric agricultural tools, solar water pumps, small tractors, automated irrigation systems, and light machinery allow for a rurality that is less dependent on fossil fuels.

The sixth transformation is digital education. Homeschooling, hybrid education, learning communities, and online training make it possible to imagine a less concentrated education system, more familial, more community-based, and more connected to real life.

The seventh transformation is the awareness of fragility. Energy, health, logistical, climatic, and geopolitical crises have shown that life completely dependent on large global chains may be highly efficient in normal times, but highly vulnerable in times of rupture.

These technologies also make possible an ultra-dispersed, low-density bioccupation. To care for forests and protect territory against catastrophes such as massive wildfires, few arrangements may be more useful than a stable network of rooted, connected, and distributed people: a presence capable of maintaining paths and breaks in vegetative fuel, practicing forestry and grazing, monitoring woodland, detecting a fire rapidly, and responding before it reaches uncontrollable dimensions.

The objective is not to occupy natural space densely or to assume that rural residence alone eliminates risk. It is to replace abandonment with a caring, low-intensity, and coordinated human presence capable of combining conservation, production, and territorial stewardship.

That is why the current moment is singular. Rurality no longer has to mean disconnection. It can mean another form of connection.

4. Basic Calculation of Footprint and Sustainable Population

The question of what population the planet can sustain has no single answer. It depends on the footprint per person.

We can express it as follows:

Sustainable population = available ecological capacity / average footprint per person

At present, humanity uses approximately more ecological resources than the planet can regenerate annually. If we simplify and say that the world functions as if it needed between 1.7 and 1.8 planets, this implies that, maintaining the current average footprint per person, the sustainable population would be approximately:

8.3 billion / 1.7 = 4.9 billion people

or, with a stricter estimate:

8.3 billion / 1.8 = 4.6 billion people

This figure does not mean that people “exceed” the planet in a moral sense. It means that, under the current average model of consumption, energy, food, urbanism, and production, total pressure exceeds the annual regenerative capacity of the planet.

However, if the average footprint per person is reduced, the sustainable population increases.

Reduction in footprint per person	Remaining footprint	Approximate sustainable population with a 1.7 factor
No reduction	100%	4.9 billion
30% reduction	70%	7.0 billion
40% reduction	60%	8.1 billion
50% reduction	50%	9.8 billion
60% reduction	40%	12.2 billion

The conclusion is fundamental: with the current population, the world does not necessarily need a dramatic reduction in inhabitants in order to approach sustainability. It needs a dramatic reduction in the average footprint per person. However, if the average footprint does not fall enough, total population also matters.

If the world population still rises towards around 10 billion before stabilizing or declining, the necessary reduction is greater. If the planet were to reach around 10.3 billion

inhabitants and remain within the biocapacity equivalent of one planet, the average footprint would have to fall approximately 50-55% compared with the current pattern.

This is not impossible, but neither is it automatic.

Autosustainables can be part of this reduction, but simply living in the countryside is not enough. The material system of life must change.

5. Technology Is Not the Problem

The annualized calculations for batteries, electric vehicles, and photovoltaics require us to qualify a possible excessively cautious interpretation of the Autosustainables model. The basic technological infrastructure of the project is not the main climatic obstacle. On the contrary: when amortized over its useful life, a stationary battery of 20 kWh per person, a shared electric vehicle per family unit, and a sufficient photovoltaic installation have a relatively low annual footprint.

This is decisive. The model is not compromised by the fact that it requires batteries, solar panels, or electric mobility. These elements are part of the solution, provided that they are durable, repairable, shared when possible, and integrated into a way of life with low compulsory mobility.

The calculation shows that the main footprint is not found in these assets, but in broader dimensions: food, construction, consumer goods, telecommunications, services, healthcare, administration, materials, and the global economic structure.

Therefore, Autosustainables should not defend itself as if its technology were a suspicious burden. It should defend itself as a material reorganization that uses low-annual-footprint technology to reduce much larger dependencies.

The global problem is not that a self-sufficient family has a battery or an electric car. The problem is that billions of people live within a system of consumption, food, mobility, construction, and services that exceeds planetary biocapacity.

This requires global sustainability to be formulated in two phases.

In a first phase, humanity must reduce its total ecological footprint. This footprint is the result of multiplying population by impact per person. If the current average impact is too high, the equivalent sustainable population is lower than the real population. Therefore, while world population remains high and average consumption remains high, a strong reduction in footprint per person is necessary.

In this phase, Autosustainables has a clear function: to make possible a structural reduction in urban, energy, food, and logistical dependence. It does not eliminate all footprint, but it can reduce a substantial part of it. The important point is that its main technical instruments — solar energy, batteries, electrification, remote work, partial self-production, and territorial networks — are compatible with this reduction.

However, even with this reduction, full sustainability may require a lower world population or, at least, a population stabilized at a level compatible with the planet’s biocapacity. This should not be formulated as a coercive population-reduction policy, but as an ecological observation: if the average footprint does not fall enough, total population must be lower; if total population remains high, the average footprint must fall much further.

This demographic reduction is not merely a normative hypothesis. In many technologically advanced and highly urbanized societies, it is already occurring naturally or culturally through fertility below replacement level. The same metropolitan structure that concentrates productivity and consumption makes family reproduction more difficult, ages the population, and, if the trend persists and is not offset, leads to contraction and even demographic collapse.

The global demographic trend appears to be moving towards stabilization and subsequent decline. This can help return humanity to an ecologically sustainable level. But that decline cannot become indefinite decay. Once a sustainable level has been reached, the challenge will no longer be only to reduce pressure, but to stabilize human continuity. Once an ecologically sustainable level has been reached, stabilizing human continuity will require recovering and maintaining fertility close to generational replacement —approximately 2.1 children per woman in low-mortality populations, as a general reference. To achieve this, it will be necessary to escape, at least partially, an urbanity that, in its present metropolitan configuration, acts as a structural sentence against family life.

6. Annualized Carbon Footprint of a Realistic Autosustainable Model

To make the model more rigorous, two things must be separated:

1. **embodied or initial emissions, meaning the emissions generated by manufacturing, building, or installing the main assets;**
2. **annual operational emissions, meaning the emissions derived from everyday use: energy, mobility, food, consumption, and services.**

This distinction is essential because an autosustainable model may have low operational emissions but significant embodied emissions. A house, batteries, solar panels, or an electric vehicle are not neutral. They have an initial footprint that must be distributed across their useful life.

Let us use a prudent baseline scenario:

- 4 people per family unit;
- 1 shared electric vehicle per family unit;
- 20 kWh of stationary battery capacity per person;
- housing of 50 m^2 per person + 50 additional m^2 per family unit;
- conventional concrete construction;
- 50-year amortization of the dwelling;
- 15-year amortization of the domestic battery;
- 20-year lifetime of the vehicle;
- 10,000 km per year per vehicle;
- own solar electricity.

Under these assumptions, the annualized carbon footprint of the model is approximately between:

3.6 and 5.2 tonnes CO_2e per person per year

A defensible central value would be:

4.2 tonnes CO_2e per person per year

This figure is not climate neutrality. But it represents a very significant reduction compared with an average European consumption footprint. Above all, it shows something important: the central technological part of the project is not what makes the model unviable. The annualized sum of battery, shared electric vehicle, and photovoltaics is relatively small compared with food, housing, goods, services, and general consumption.

The technical conclusion is this:

The Autosustainables model is materially promising because the technologies that make it possible have an acceptable annualized footprint. The main challenge is not the battery or the solar panel, but reducing residual consumption as a whole and stabilizing population at a globally sustainable level, also in demographic terms, through the recovery and maintenance of population replacement levels.

7. Housing: The Hidden Footprint of the Self-Sufficient House

Housing is one of the critical points. An energy self-sufficient house may have low operational emissions, but a high embodied footprint if built with carbon-intensive materials.

Let us assume:

Total surface = 50 m^2 per person + 50 m^2 per family unit

For a family of 4 people:

50 × 4 + 50 = 250 m^2 total

Per person:

250 / 4 = 62.5 m^2 per person

If we use a central value of 600 $kgCO_2e$ per m^2 built for conventional construction, the calculation is:

62.5 m^2/person × 600 $kgCO_2e/m^2$ = 37,500 $kgCO_2e$/person

Amortized over 50 years:

37,500 / 50 = 750 $kgCO_2e$/person/year

That is:

Annualized housing: 0.75 tCO_2e/person/year

This shows that a concrete house, even if energy self-sufficient, is not climatically free. But it does not invalidate the model. It simply indicates that an important part of future improvement must come from housing: reducing intensive materials, extending useful life, reusing structures, building with lower footprints, and avoiding oversized houses.

The model improves greatly if:

- surface per person is reduced;

- lower-footprint materials are used, including biogenic materials capable of storing carbon —such as straw, timber, and other plant fibers— and, where full life-cycle analysis permits, of achieving a potentially very low or even negative footprint; these materials may be used predominantly or hybridized with concrete, steel, and other durable components;
- the building's useful life is extended to 75 or 100 years;
- mixed structures with wood, earth, lime, local stone, recycled materials, or low-emission prefabricated solutions are used;
- community spaces are shared instead of duplicated inside each dwelling.

If the construction footprint fell from 600 to 350 $kgCO_2e/m^2$, the same dwelling would fall approximately from 0.75 to 0.44 tCO_2e/person/year. With more compact homes, longer useful lives, and intensive use of biogenic materials, the annualized value could approach, in favorable scenarios, 0.30 tCO_2e per person per year; this figure should be understood as a design scenario and verified through a specific life-cycle assessment.

Therefore, housing is one of the great levers of the model.

8. Stationary Battery: 20 kWh per Person

A stationary battery of 20 kWh per person may seem large, but climatically it is not the heaviest component if it lasts long enough.

Let us assume:

- 20 kWh of battery per person;
- 69 $kgCO_2e$ per kWh of battery as a prudent value;
- 15-year useful life.

Calculation:

20 kWh × 69 $kgCO_2e$/kWh = 1,380 $kgCO_2e$/person

Amortized over 15 years:

1,380 / 15 = 92 $kgCO_2e$/person/year

That is:

Annualized stationary battery: 0.09 tCO_2e/person/year

Even if the real value were higher, for example 100 $kgCO_2e$/kWh, the calculation would be:

20 × 100 = 2,000 $kgCO_2e$

2,000 / 15 = 133 $kgCO_2e$/person/year

That is, 0.13 tCO_2e/person/year.

This figure is low relative to a person's total footprint. That is why the battery should not be presented as the weak point of the project, but as a technology that makes it possible to replace much larger dependencies through a relatively acceptable material investment.

The battery is important, but it does not destroy the model. What would be problematic is massively oversizing batteries, replacing them too frequently, or producing them through highly carbonized supply chains.

The autosustainable model should aim for:

- long-life batteries;
- chemistries less dependent on critical materials;
- repairable or modular batteries;
- recycling;
- shared use through microgrids;
- combination with demand management, not only accumulation.

The best battery is not always the largest one, but the one that avoids dependence without multiplying materials unnecessarily.

9. Electric Vehicle: Acceptable if Shared and Lightly Used

The electric vehicle is another relevant component. It has no tailpipe emissions, but it does have manufacturing emissions, especially battery, steel, aluminum, electronics, and tires.

Let us assume an average electric vehicle with an approximate manufacturing footprint of 10.4 tCO_2e, including the battery.

If it lasts 20 years:

10.4 tCO_2e / 20 = 0.52 tCO_2e/year per vehicle

If the vehicle is shared by 4 people:

0.52 / 4 = 0.13 tCO_2e/person/year

That is:

Annualized electric vehicle: 0.13 tCO_2e/person/year

But if there is one car per adult, or if the vehicle lasts less, the footprint per person rises quickly.

Now let us calculate use.

Assume:

- 10,000 km per year per vehicle;
- 4 people per vehicle;
- 2,500 km per person per year;
- real consumption of 18 kWh/100 km.

Calculation:

2,500 km × 0.18 kWh/km = 450 kWh/person/year

If this electricity comes from own photovoltaics with a life-cycle footprint of around 35.8 gCO_2e/kWh:

450 kWh × 35.8 gCO_2e/kWh = 16,110 gCO_2e/person/year

That is:

Annual use of the car with own solar electricity: 0.016 tCO_2e/person/year

This is very low. The conclusion is important: in a solar autosustainable model, the main climate problem of the car is not the electricity used, but manufacturing, the number of vehicles per person, vehicle lifetime, and kilometers traveled.

Therefore, the model is solid only if it reduces compulsory mobility:

- remote work;
- local services;
- grouped purchases;
- shared logistics;
- community vehicles;
- light electric transport;
- functional paths;
- minimization of daily commuting.

Living in the countryside while driving many kilometers every day to work in the city would be a contradiction of the model.

10. Solar Panels Required

Let us assume an autosustainable electricity consumption per person:

Use	kWh/person/year
Domestic electricity, appliances, efficient climate control, and partial hot water	2,000
Internet, tools, water pump, and small productive uses	150
Battery and inverter losses	200
Shared electric vehicle	450
Total	**2,800**

In Spain, a photovoltaic installation can produce approximately 1,300-1,500 kWh annually per installed kWp, depending on area, inclination, orientation, shade, and system quality.

Using 1,350 kWh/kWp as a prudent value:

2,800 kWh/person/year / 1,350 kWh/kWp = 2.07 kWp/person

This would be the theoretical annual minimum. But for a semi-off-grid or off-grid model, more margin is required for winter, cloudy days, degradation, losses, heating, water pumps, tools, vehicle charging, and autonomy.

Therefore, a prudent recommendation would be:

3 kWp/person as a functional basis

or:

4 kWp/person for greater winter autonomy

The carbon footprint of photovoltaics, if attributed per kWh generated, would be approximately:

2,800 kWh/person/year × 35.8 gCO_2e/kWh = 100 $kgCO_2e$/person/year

That is:

Annualized solar: 0.10 tCO_2e/person/year

This figure includes the embodied footprint of the panels distributed over the system's useful life. It is low compared with housing, food, or general consumption.

11. Central Table of the Autosustainable Model

Component	Calculation	tCO_2e/person/year
Concrete housing, 62.5 m²/person, 600 kg/m², 50 years	62.5 × 600 / 50	**0.75 (≈0.30 in smaller, longer-lasting homes or homes making intensive use of biogenic materials, subject to a specific LCA)**
Domestic battery, 20 kWh/person, 69 kg/kWh, 15 years	20 × 69 / 15	**0.09**
Shared electric vehicle, 1 per 4 people, 20 years	10.4 t / 20 / 4	**0.13**
Total solar electricity, including vehicle	2,800 kWh × 35.8 g	**0.10**
Moderate food, partially local, with less intensive meat	prudent estimate	**1.0 – 1.5**
Consumer goods, clothing, technology, furniture, tools, and repairs	prudent estimate	**0.8 – 1.5**
Services, healthcare, administration, telecommunications, and public share	prudent estimate	**0.7 – 1.2**
Reasonable total		**3.6 – 5.2**

Central value:

4.2 tCO_2e/person/year

This result is useful because it avoids both naïve optimism and absolute pessimism.

It does not say that the model is neutral. It says that it is a model of strong reduction. It also says that technology is not its main problem. Battery, shared electric vehicle, and solar power may together represent around 0.3 tCO_2e per person per year. This is very little compared with the total.

Therefore, if the model does not yet reach full sustainability, it is not because the autosustainable infrastructure is too heavy, but because any modern life still retains a footprint in food, housing, services, telecommunications, healthcare, administration, materials, clothing, tools, devices, repairs, and general consumption.

This is a fundamental distinction.

Autosustainables does not fail because of its technological core. Its technological core is precisely what makes reduction viable.

12. Sensitivity Scenarios

Scenario	Approximate result
Highly disciplined model: low-carbon home, shared vehicle, low-meat diet, and sober consumption	**2.5 – 3.2 tCO_2e/person/year**
Realistic autosustainable model with concrete, shared vehicle, and moderate consumption	**4.0 – 4.5 tCO_2e/person/year**
Comfortable European model: large home, greater consumption, meat, and more purchases	**5.5 – 7.0 tCO_2e/person/year**
False self-sufficiency: large home, one or two cars, many kilometres, and high consumption	**7.0 – 10.0+ tCO_2e/person/year**

This allows us to formulate a central rule:

Autosustainable deurbanism is not automatically sustainable. But neither is it made unviable by technology. It is sustainable if it avoids reproducing the metropolitan consumption pattern in the countryside.

Therefore, solar panels, batteries, and a small garden are not enough. A coherent way of life is required:

- less compulsory mobility;
- fewer cars per person;
- greater durability of assets;
- less superfluous consumption;
- more repair;
- more self-production;
- more local food;
- more cooperation between plots;
- lower-carbon construction;
- less intensive meat;
- greater material sobriety.
- stronger families and greater fraternity.

13. The Small Garden and the Chicken Coop: Partial Self-Production, Not a Fantasy of Autarky

A central idea of the project is that almost everyone could have access to a minimal form of self-production: a small garden, fruit trees, composting, a modest chicken coop, collected or reused water, and family or community production of fresh food.

This does not mean that every family must produce all of its food. Total autarky is inefficient and probably impossible. But partial self-production has ecological, economic, pedagogical, and civilizational value.

Let us make a simple calculation.

If each person had around 100 m^2 of horticultural or agroforestry productive space, then for 8.3 billion people we would need:

8.3 billion × 100 m^2 = 830,000 km^2

If it were 200 m² per person:

8.3 billion × 200 m² = 1,660,000 km²

These figures are large, but not absurd at a planetary scale. They do not imply replacing all global agriculture, but rather partially redistributing fresh, family, and community-based production.

The chicken coop, likewise, should not be understood as a miniaturized form of intensive livestock farming. A sustainable chicken coop only makes sense if it is fed partly from leftovers, surplus, local grain, insects, pasture, or short circuits. If it depends entirely on industrial feed, transported and produced through monocultures, it loses part of its ecological justification.

The value of the small garden and the chicken coop is not only caloric. It is also cultural. They return to the family a direct experience of material life: sowing, feeding, harvesting, composting, repairing, waiting, observing, caring. This element is important because sustainability is not only a question of technical efficiency, but of civilizational mentality.

A society that never sees how food is produced tends to treat the world as a logistical abstraction.

This separation can be read through two related but distinct Marxian concepts. In the Economic and Philosophic Manuscripts of 1844, Karl Marx described the worker's alienation from the product of labor: what their hands produce appears as something alien and separated from their own activity. In Capital, commodity fetishism explains how the human, labor, and territorial relations that produce goods are concealed behind the apparently autonomous existence of commodities. Food then ceases to appear as the fruit of hands, land, and time, and appears only as an object available within the logistical chain.

14. Planned Deurbanism: Neither Garden City nor Suburbia

The Autosustainables project has partial precedents, but it does not fully identify with any of them.

It is not exactly the garden city, because the garden city still begins from a planned urban form, with a core, a green belt, and a balance between city and countryside. Autosustainables goes further: it does not seek merely a greener city, but a territorial network in which the main unit is no longer the city, but a modern, technologically enabled, and networked rurality.

It is not suburbia, because suburbia is usually extended urban dependence: dispersed houses, compulsory car use, little production, high consumption, and the absence of its own centrality. Autosustainables, by contrast, requires energy autonomy, partial production, reduced mobility, and community networks.

It is not an ecovillage in the strict sense, because the ecovillage is often a small intentional community, culturally well-defined and difficult to scale. Autosustainables also wants to begin with individual plots, families, or small nodes, without waiting for an ideologically homogeneous community.

It is not survivalism, because it does not seek to save oneself alone. Survivalism tends to imagine collapse as a scenario of separation. Autosustainables imagines crisis as a reason to create networks. It is a resilient network united in society: local autonomy does not imply isolation, but a greater capacity for cooperation and mutual aid between nodes capable of sustaining part of their own existence.

It is not only environmental sustainability, because it also incorporates population, educational, economic, family, and territorial sustainability.

The appropriate concept is therefore:

networked autosustainable deurbanism

It is deurbanism because it questions the city as the compulsory center.

It is autosustainable because it seeks to reduce basic material dependencies.

It is networked because it does not defend isolation, but connection between autonomous cells.

15. City, Birth Rates, and Life: Why the Metropolis Tends to Sterilize Continuity

The Autosustainables model has not only an ecological justification. It also has a demographic one.

The contemporary city, especially the expensive, dense, and hypercompetitive metropolis, tends to make birth rates more difficult. Not always directly or intentionally, but structurally. The modern city concentrates opportunities, but it also concentrates costs. It offers work, culture, services, and connection, but often in exchange for small dwellings, high prices, total wage dependence, exhausting mobility, absence of land, fragmented time, and difficulty in sustaining larger families.

The city is not necessarily antinatalist by ideology. It is often antinatalist by structure.

The first factor is housing. A family needs space, stability, and predictability. The expensive city often offers the opposite: high rents, small apartments, residential insecurity, long-term debt, and absolute dependence on monetary salary. When forming a family means needing more square meters in the most expensive housing market, birth rates are penalized.

The second factor is time. Urban life tends to separate housing, work, school, family, leisure, and consumption into different spaces. This separation generates commuting, rigid schedules, and a chronic sense of lack of time. Raising children requires dense time, continuity, and availability. The city offers many activities, but it often destroys the organic time of family life.

The third factor is wage dependence. In a city, the family tends to be above all a unit of consumption. It must buy almost everything it needs: food, energy, space, care, supplementary education, mobility, leisure, and security. When the family produces almost nothing directly, each child appears as an additional cost within a tense monetary system. Fertility becomes subordinated to income.

The fourth factor is the disappearance of productive land. Without land, a garden, a workshop, storage space, animals, trees, or outdoor space, the family is separated from

any material base of its own. It cannot offset monetary income through self-production. It cannot turn part of family time into direct production. Everything passes through the market. And when everything passes through the market, the family becomes fragile: its members must continually sell their labor power in order to eat, dwell, keep warm, travel, and care.

The fifth factor is the institutionalization of childrearing. In the urban model, children constantly need to be moved between institutions: school, extracurricular activities, services, healthcare, leisure spaces. This structure can be useful, but it also makes childrearing dependent on a complex, expensive, and external infrastructure. The family loses educational and logistical autonomy.

The recovery of family autonomy should not eliminate school socialization. The model should ensure stable, in-person educational spaces with other children, even if —where the legal and pedagogical framework allowed— schooling could be organized over two or three days per week and combined with home, digital, community-based, and territorially grounded education. Less total institutionalization must not mean less socialization.

The sixth factor is status competition. The city intensifies social comparison: career, consumption, appearance, position, experiences, qualifications, housing, and professional networks, as if the whole of life consisted in seeing who manages to occupy the highest floor of the city's buildings. In this context, having children can be perceived as an interruption or a risk to the individual project of competition. Urban life tends to maximize individual options and minimize binding continuities.

The seventh factor is verticality and anonymity. Life in apartments, weak communities, and high-turnover neighborhoods makes informal shared childrearing more difficult. In many traditional forms of life, children grew up in environments where extended family, neighbors, animals, fields, workshops, and streets formed a continuous ecosystem. The modern city often replaces this ecosystem with enclosed, regulated, and separated spaces.

None of this means that the countryside automatically produces higher birth rates or that every form of rurality is family-friendly. Poor, isolated rurality without services, young women, opportunities, or community can also be demographically dead. What relatively favors birth rates is not just any countryside, but an inhabitable, technological, connected, productive, and community-based rurality.

Autosustainable rurality can favor family continuity for structural reasons.

First, it can offer more space per family unit. Space does not create children by itself, but it reduces one of the main material obstacles to having them.

Second, it can reduce the relative cost of life if it combines own energy, partial food self-production, durable housing, and lower dependence on urban consumption.

Third, it can integrate housing, work, education, gardens, care, and everyday life into one ecosystem. This reduces the fragmentation of time.

Fourth, it can return to the family a productive dimension. A family with a garden, chicken coop, workshop, own energy, and space is not only a consuming unit. It is also a unit that produces, preserves, repairs, and transmits.

Fifth, it can allow a more open childhood, less enclosed and more connected to nature, real work, and material responsibility.

Sixth, it can allow forms of domestic, community-based, or hybrid education that reduce absolute dependence on centralized institutions.

Seventh, it can rebuild support networks between plots, families, and microcommunities. Childrearing does not need only money. It needs community, continuity, and presence.

Therefore, autosustainable rurality is not relatively natalist because it idealizes the past, but because it can reduce some of the structural obstacles that the metropolis imposes on the family.

The city tends to turn the child into a cost.

The self-sufficient plot can turn the child back into continuity.

The city tends to separate life, work, education, and food.

The self-sufficient plot can reintegrate them.

The city tends to turn the family into a unit of consumption.

The self-sufficient plot can make it a unit of life.

This point is fundamental to the project. Autosustainables does not propose only a reduction of footprint. It proposes a form of life in which ecological sustainability does not require demographic disappearance, but a living stabilization of human population within planetary limits.

16. Conditions for It to Be Truly Sustainable

The model is defensible only if it meets certain conditions. Without these conditions, it could degenerate into sprawl, land consumption, and rural elitism.

The minimum conditions are the following.

First: the plot must produce a significant part of its energy through renewables.

Second: it must have storage or connection to a microgrid that reduces fossil dependence.

Third: it must reduce compulsory mobility. Living far away but driving many kilometers every day cancels much of the benefit.

Fourth: the dwelling must be moderate, efficient, and low in material footprint. Deurbanism cannot mean oversized houses.

Fifth: there must be partial food self-production or participation in local food networks.

Sixth: the diet must reduce the highest-footprint foods, especially intensive meat.

Seventh: water must be managed as a limit, not as an infinite resource.

Eighth: plots must connect with shared services: tools, workshops, vehicles, education, proximity healthcare, logistics, and cooperatives.

Ninth: the model must be legally orderable. It cannot consist only of urban planning irregularities.

Tenth: it must be socially replicable. If it is accessible only to wealthy people who can buy large estates, it is not a population paradigm, but a class retreat.

Eleventh: it must be family-habitable. A self-sufficient plot cannot be merely an energy machine or a productive estate. It must be a place where raising, educating, caring, and transmitting are materially possible.

This last condition is decisive. Autosustainables only has deep meaning if it can become an architecture for many, not a privilege for a few.

17. Three Phases of Sustainability: Reduction, Balance, and Continuity

The Autosustainables project must be understood in three phases.

Phase 1: Footprint Reduction

The first phase consists of drastically reducing urban dependence and footprint per person.

Here the model is already useful even if it is not perfect. A footprint of 4.2 tCO_2e per person per year is not enough as a final global horizon if strict sustainability is desired, but it may represent a very strong reduction compared with the average European consumption pattern.

The function of this phase is to demonstrate that another form of life can already begin: less dependence, less mobility, more own energy, more local food, more durability, more territorial life.

Phase 2: Strict Global Sustainability

The second phase requires the model to lower the footprint even further while the world population stabilizes or declines towards levels compatible with planetary biocapacity.

This will require:

- battery manufacturing with near-zero-carbon electricity;
- solar panels produced through decarbonized industrial chains;
- low-footprint housing;
- systematic recycling;
- reduction of conventional cement and steel;
- lower-impact diets;
- soil restoration;
- agroforestry;
- biogenic carbon capture;
- waste reduction;
- local economies of repair and reuse.

In this phase, the objective should be to approach:

2 tCO_2e/person/year

and, later:

1 net tCO_2e/person/year

This second target would only be plausible with real removals and with a much cleaner industry than today’s.

But this phase also has a demographic dimension. If the world population remains too high relative to biocapacity and residual consumption does not fall enough, sustainability does not add up. That is why the global demographic transition — with falling fertility and eventual stabilization or decline of world population — may be part of the return to ecological balance.

Phase 3: Demographic and Existential Self-Sustainability

The third phase is the most philosophically profound.

Once humanity has reduced its footprint and the world population tends to stabilize or decline, the problem will no longer be only how to avoid excessive human pressure on the planet. The problem will also be how to prevent human life itself from becoming incapable of continuing.

In other words: global sustainability cannot be only ecological. It must also be demographic.

A humanity that is ecologically sustainable but demographically unable to reproduce is not truly self-sustaining. Sustainability cannot consist only in reducing, contracting, and consuming less. It must also consist in maintaining, transmitting, and continuing.

Therefore, when population reaches a level compatible with planetary limits, family and community units must also be able to sustain themselves existentially. This means having material conditions so that the family is not a consuming unit condemned to extinction, but a unit of continuity: housing, land, energy, food, time, education, community, and transmission.

The model of living plots within a deurban network is fundamental to this second phase. The self-sufficient plot is not only a unit of ecological reduction. It is also a unit of demographic sustainability. It allows the family to recover space, rootedness, production, education, and continuity.

In this sense, Autosustainables does not propose only environmental sustainability. It proposes a complete sequence of global sustainability:

first, reduce the footprint in order to return within planetary limits;

then, stabilize population at a sustainable level;

finally, ensure that each family unit can continue within that equilibrium.

A sustainable planet is not a planet where humanity declines indefinitely. It is a planet where human population remains within ecological limits while also preserving the capacity to reproduce, educate, transmit, and continue.

That is why the project’s motto can be formulated as:

Autosustainables for global sustainability.

And this global sustainability has two inseparable faces:

ecological sustainability of the planet and existential self-sustainability of the human family.

18. Autosustainables and Demography: From the Problem of Excess to the Problem of Extinction

The twentieth century thought of population mainly as excess. Too many people, too much pressure, too much demand, too much consumption.

The twenty-first century may end up discovering the opposite problem: technological, wealthy, urban societies that are no longer capable of reproducing themselves.

This shift is fundamental. At first, sustainability seems to require less impact, less consumption, and perhaps less population growth. But later, when population stabilizes or declines, sustainability comes to require continuity.

Sustainability cannot only mean reducing. It must also mean sustaining.

Sustaining the soil.

Sustaining water.

Sustaining energy.

Sustaining food.

Sustaining the family.

Sustaining transmission.

Sustaining life.

The contemporary city often makes this continuity more difficult: expensive housing, small spaces, uprooting, total wage dependence, institutionalized childhood, absence of land, high costs, fragmented time, and the practical impossibility of larger family projects.

Autosustainable deurbanism can reverse this logic. Instead of making the family completely dependent on the city, it proposes a material structure in which the family recovers space, energy, food, time, community, and rootedness.

This is not merely an ecological proposal. It is a civilizational proposal.

19. Why It Is Relevant Now

The relevance of the project arises from the convergence of eight crises.

The first is the climate crisis. The centralized fossil model must reduce emissions rapidly. A distributed, electrified, renewable life can contribute to this reduction if it avoids the rebound effect of dispersed consumption.

The second is the housing crisis. Metropolises concentrate opportunities but also expel population. Urban land becomes more expensive because almost all modern life seems required to pass through the city. Deurbanizing part of residential demand can reduce pressure on the system.

The third is the food and logistics crisis. Urban populations depend on long and invisible chains. Partial self-production does not replace professional agriculture, but it creates resilience and food culture.

The fourth is the demographic crisis. Dense, expensive, small urban dwellings can make larger family projects more difficult. A life with space, more affordable housing, and territorial rootedness can facilitate forms of family continuity that are currently blocked.

The fifth is the crisis of meaning. Hyperconnected urban life can generate material disconnection: screens, consumption, abstract work, delocalized food, childhood separated from nature, and total dependence on impersonal infrastructures. Autosustainables proposes a reconnection between technology and land. In a contemporary sense, this disconnection reproduces the alienation of the product from the producer described by Karl Marx: the consumer ceases to recognize the hands, processes, territories, and social relations embodied in what they use.

The sixth is the crisis of everyday sovereignty. Many people no longer control any of the basic elements of their life: neither energy, nor food, nor water, nor housing, nor education, nor time. Autosustainables wants to return part of this control to the family and community unit.

The seventh is the crisis of continuity. A society can be technologically advanced and yet unable to reproduce itself. It can be efficient and terminal at the same time. Autosustainables seeks to avoid this contradiction: it does not propose only a life with fewer emissions, but a life capable of continuing within planetary limits.

The eighth is the crisis of territorial and forest abandonment. Rural depopulation and the loss of agricultural, livestock, and forestry activity reduce the maintenance of paths, terraces, productive mosaics, and breaks in vegetative fuel. In certain regions, especially Mediterranean ones, this lack of management favors continuous masses of vegetation and increases the potential for extreme wildfires. A low-density deurban network can provide presence, grazing, forestry, monitoring, early detection, and response capacity without turning woodland into an urban development.

The same restoration of soils, terraces, channels, and managed vegetation can, depending on local conditions, improve water infiltration and retention and reduce certain processes of erosion and runoff. It does not by itself explain fires or floods, but it responds to a real crisis of abandonment and insufficient territorial care.

This is the central philosophical point: it is not about choosing between modernity and rurality. It is about building a technological rurality capable of overcoming the false alternative between the modern city and the backward countryside.

19.1. Correspondence Between Distributed Energy and Distributed Population

Solar energy has a spatial logic different from that of large centralized sources. Its territorial power density is lower than that of highly concentrated sources such as nuclear energy, but its modular character allows generation to be located on roofs, plots, workshops, farms, and small microgrids, close to points of consumption.

There is therefore a structural affinity —not a necessary equivalence— between distributed energy and distributed population. When housing, consumption, and energy production are brought closer together, demand peaks, distribution losses, and part of the need for major electricity transmission corridors and oversized urban infrastructures can be reduced.

Distributed generation does not eliminate general networks, but it changes their function and reduces exclusive dependence on them.

The same correspondence extends to food, water, and material cycles. Energy and food self-sufficiency require land, capture, storage, and local productive capacity, conditions that are difficult to reconcile with the extreme density of the metropolis. The renewable transition reaches its greatest territorial coherence when the distribution of generation is accompanied by a partial distribution of residence, production, and consumption.

20. Conclusion: Sustainability Begins with the Form of Inhabiting

Sustainability is not merely changing the energy source of the same model of life. It is not enough to put solar panels on a civilization that remains hypercentralized, hyperconsumerist, and hyperdependent.

The form of inhabiting must change.

Changing the form of dwelling does not merely mean changing one's home. In the sense opened by Heidegger, it means transforming the relationship between existence, place, production, community, and continuity. Autosustainable deurbanism therefore proposes not only another architecture, but another way of being in the world.

Autosustainables proposes that the basic cell of the future should not be the dependent urban apartment, but the connected living plot. Not as an individual escape, but as a replicable unit of a new territorial system.

The calculations show that a realistic version of the model, with conventional housing, 20 kWh of battery per person, a shared electric vehicle, and own photovoltaic electricity, could be around 4.2 tCO_2e per person per year. This figure is not yet full sustainability, but it is a very significant reduction compared with an average European pattern.

Even more importantly: the calculations show that the technological part proper to the model is not its weak point. Batteries, solar panels, and shared electric vehicles have a relatively small annualized footprint. The main challenge is the rest of modern life: food, construction, services, consumption, administration, telecommunications, and general production.

To reach strict global sustainability, it will be necessary to go further: less embodied carbon in buildings, cleaner batteries, decarbonized industry, lower-impact diets, recycling, agroforestry, soil restoration, more material sobriety, and a world population stabilized at levels compatible with planetary biocapacity.

But the path is already visible.

First, reduce the footprint.

Then, balance human life with the planet's biocapacity.

Finally, ensure that this ecologically sustainable humanity is also demographically self-sustaining.

A sustainable planet needs strong families, fraternal communities, and plots that are autosustainable in themselves. Global sustainability cannot arise only from above: it must become practicable in its family and territorial cells.

In this sense, the model has an almost fractal structure. The plot's logic of relative autonomy, reproduction, balance, and cooperation expands into the community, the region, and the planet; and, in the opposite direction, the planetary limit protects and guides each of its cells. The plot is the cell, the network is the organism, and the planet is the common limit.

The future does not necessarily have to be a more efficient megacity.

It can be a network of autosustainable units: families, plots, farms, communities, cooperatives, and territorial nodes capable of living with less dependence, less footprint, and more rootedness.

It is not enough to replace fossil-fuel plants with solar panels while leaving a hyperconcentrated territorial structure intact. A genuinely renewable civilization must also reconsider where and how it dwells.

The renewable future will be deurban or it will not be.

The decisive question is not only how many humans the planet can support.

The decisive question is what kind of humans, with what kind of life, with what kind of energy, with what kind of food, with what kind of territory, with what kind of family, and with what kind of freedom.

Autosustainables answers:

a distributed, connected, rooted, ecologically lighter humanity, demographically capable of continuing.

Self-sufficiency in the cell, fraternity in the network, and sustainability on the planet.

Not less civilization.

Another civilization.

Autosustainables for global sustainability.